

1. Studies in the Holothuroidea.—V. Further Notes on the Cotton-Spinner. By Prof. F. JEFFREY BELL, M.A., Sec. R.M.S.

[Received November 1, 1884.]

Owing to the kindness of Mr. Snell of Truro, who has, on two occasions, been so good as to forward me specimens of the Cotton-Spinner, I am able to give some little further information with regard to the characters of this incompletely-known Holothurian. Unfortunately, however, all the trouble and care that has been taken has not been rewarded by the arrival of living specimens in London; the investigation into the physiology of this interesting form and the complete knowledge of its minute structure, which is best gained from a study of perfectly fresh specimens, will, I doubt not, be undertaken at the Biological Laboratory soon to be erected at Plymouth.

The specimens forwarded to me came from Durgan, a fishing-village seven miles from Falmouth, where they are reported to be abundant at a depth of 10 to 20 fathoms; they appear to be objects of superstitious dread to the fishermen, who always throw overboard the "Sea-cows," as Mr. Snell says they call them.

When still comparatively fresh, *Holothuria nigra* is seen to be of a bright yellow colour beneath, and has the suckers distributed with fair regularity over that surface, though a bare patch is often apparent anteriorly; the dorsal surface is black, slimy, and papillose, but without suckers; the cuticle is exceedingly thin, and often comes off in flakes, leaving patches of a more dead hue exposed. The lower surface is flattened, and the upper slightly convex; or the whole creature may be more rounded or sausage-shaped. The cloacal orifice looks upwards. The body-wall is firm and smooth, but varies in the extent to which it is slimy to the touch.

In a specimen which was more or less flattened the length was observed to be 165 mm., and the breadth of the body 38; a sausage-shaped example measured 135 mm., and had the greatest girth of its body 120 mm., so that it was very stout.

After standing in alcohol (40 per cent. over proof) for an hour, specimens were observed to have stained the fluid; the solution was fluorescent, giving a greenish colour with reflected and a yellow with transmitted light. This colour does not seem to be lost by exposing the alcohol to sunlight; at any rate, it has not disappeared after an interval of more than six weeks' exposure to daylight.

Like many other characteristic colouring-matters, that of the Cotton-Spinner does not present us with any absorption-bands. As will be shown, however, it has some very striking resemblances to the colouring-matter described by Prof. Moseley as antedonin¹.

¹ Quart. Journ. Micr. Sci. xvii. 1877, p. 8 *et seq.*

After treatment with strong hydrochloric acid the alcoholic solution becomes yellowish in reflected as well as in transmitted light: it becomes dirty yellow on the addition of ammonia, and throws down a turbid precipitate which gradually became more and more flocculent; this was at first of a dirty white colour, but became yellow on standing for a short time. Just as in the case of antedonin, the precipitate from the ammoniacal solution was very abundant, but, unlike it, the solution was much less strongly coloured after the deposition of the precipitate. After filtration the precipitate was left as a yellowish powder, which was insoluble in water or alcohol, but dissolved pretty readily in acidified alcohol; in this point it again resembles antedonin. After solution in acidified alcohol, the precipitate became of a faint yellow colour, but did not give a green reflection. Further addition of alkaline reagents to the filtered alcohol produced a further precipitate.

On the whole, then, it is clear that there is in *Holothuria nigra* a colouring-matter of the same character as antedonin: but if the body now under consideration has distinctive absorption-bands, they are in the Cotton-Spinner obscured by another colouring-matter, which is especially richly deposited at the distal or attached end of the Cuvierian tubes, and which readily, after solution in alcohol, stains the human skin yellow. The viscera are at least as much as the integument the seat of the antedonin-like colouring-matter, for spirit which has only come into contact with the viscera is as distinctly yellow and green as is that in which the whole of the body is preserved. Here again, then, we have an example of that diffusion of colouring-matter through the tissues of an Echinoderm to which Prof. Moseley has, in the paper cited, already directed attention.

The fact that the threads of the Cuvierian organs swelled out in water led me to try and see if I could detect the presence of mucin. No response, however, in that direction was given by the ordinary experiment of adding to the water, in which some tubes had been standing for more than ten days, solid chloride of sodium, nor did I get any precipitate with acetic acid. Shortly after death the threads are hardly at all sticky, but after a few days' treatment with strong salt solution they become much more so; the threads are quite well preserved from putrefaction, even in hot weather, by being placed in strong salt solution: a solution not carefully sheltered from atmospheric air harboured but few bacteria after being some ten weeks in a not over-clean room. If, however, the threads are left in seawater or exposed to the air they rapidly undergo putrefaction, and give off a more offensive odour than any other decomposing animal substance with which I am acquainted.

In one specimen forwarded to me the tubes had evidently been protruded in a natural manner: a compact strand of about an inch in length and one fifth of an inch in thickness protruded from the cloacal orifice; this at its free end was frayed out into a large number of comparatively fine tubes which were attached to the seaweed in the water, and extended over about two inches in breadth. As I

pointed out at the time in 'Nature,'¹ about as much had been expelled as would occupy the greater part of the cloacal cavity. The information forwarded to me by Mrs. Fisher, and reported in the same journal², is further evidence that the Holothurian is capable of emitting threads which are disagreeable to the human skin at any rate.

The histological character of these tubes has been so fully worked out by M. Jourdain and Dr. Hamann in the essays to which reference has already been made that it is unnecessary here to enter into a detailed account. I have to say, however, that what has most struck me in the tubes of *H. nigra* has been the great abundance of the connective tissue. When a tube has been drawn out to its utmost tenuity, so fine indeed as to be almost invisible to the naked eye, it is seen under a magnifying-power of 500 diameters to consist of several fine fibres; a somewhat thicker portion differs only in having the fine fibres more closely packed together. It seems, then, to be pretty clear that the elongation of the threads is due to the uncoiling of the connective-tissue fibres. When thus uncoiled they appear to have no outer epithelial coating, and it is therefore difficult to understand how they can be sticky if the glands figured by Hamann have the function that he ascribes to them. This is a point, however, that can only be worked out with living specimens, the threads *in situ*, extended, and elongated being severally and comparatively examined.

In all the specimens whose intestinal tracts were examined these organs were found to have contents formed of a slaty-grey pultaceous mass, clearly made up of decomposing material; I got no such evidence of the character of the food as was presented to Mr. Peach.

With regard to the name that should be applied to the Cotton-Spinner, the Rev. Dr. Norman informs me that he is of opinion that *H. nigra* is a synonym of *H. poli* of Delle Chiaje, or *H. tubulosa* of Sars. I cannot, however, in fresh, any more than in specimens long since preserved in spirit, detect the large spicules in the suckers by which the Mediterranean species is, as is well known, to be detected.

I am greatly indebted to the reverend naturalist for reminding me that *Holothuria intestinalis* was dredged in the Minch by Forbes and Goodsir in 1850³, and by himself in the same locality in 1866⁴; so that "*H. nigra*" has a fellow in the British Seas.

¹ Aug. 7, 1884, p. 335.

² June 26, p. 193.

³ Traus. Roy. Soc. Edinb. xx. p. 309, pl. ix. fig. 1.

⁴ Rep. Brit. Assoc. 1866, p. 195.